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LAZORCIK, JASON L	

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1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/783,979	ASUKE ET AL.	
	Examiner	Art Unit	
	JASON L. LAZORCIK	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6 and 8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6,and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 24, 2008 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4, 6, and 8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant's amendments to independent claims 1 and 6 as presented in the June 24, 2008 amendment require in part that the annealing treatment unit is "larger than each of the plural types of treatment units".

On this matter, Applicant points to the Specification paragraphs [0127], [0128], and figure 10 as providing basis for the instant limitation. After careful review of the

aforementioned passages and figures as well as the broader Specification, it is the Examiners position that Applicant does not provide sufficient basis to support the newly presented limitation. Specifically, Applicants Specification paragraph [0128] states only that the annealing treatment unit is “relatively large” but this passage does not provide sufficient support to claim that said annealing treatment unit is "larger than each of the plural types of treatment units". Paragraph [0127] of the Specification as well as the noted figure 1 provide substantially no support for the instant limitation.

In view of the foregoing, it is the Examiners’ position that the Specification as originally filed does not reasonably convey to one of ordinary skill in the art that Applicant had possession of the claimed invention at time of filing. Further, one of ordinary skill in the art would not necessarily have been apprised of the noted limitation upon a plain reading of the specification as originally filed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsumori (US 6,230,722 B1) in view of Hashimoto et al. (US 6,261,378) and the ordinary level of skill in the art at the time of the invention.

Mitsumori teaches a wet treatment method and apparatus for treatment of "large-sized substrates such as … a substrate for liquid crystal" (Column 1, lines 14-17). As depicted in the instant reference figure 11A (see below). Mitsumori teaches that the substrate (1) is subjected to continuous plural types of treatments wherein the substrate is selectively held above treatment units (2cB, 2bB, 2AB) with the surface targeted for treatment facing downward and said units operating upward. It is evident from the figure that excess liquid applied to the surface targeted for treatment is permitted to "fall away from the surface after being applied to the surface".

FIG. 1

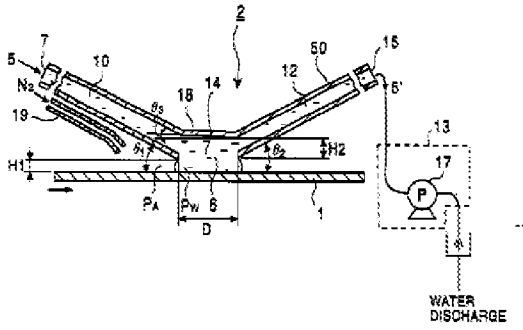
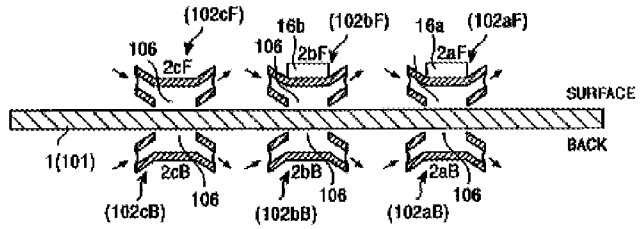


FIG. 11A



In accordance with Applicants particular claimed nozzle element, it is understood that said nozzle comprises the following particular structural features; 1) a nozzle for directing a fluid at an incident angle of less than 45 degrees with respect to the treatment surface plane, 2) a fluid recovery path which is normal to the treatment surface, and 3) 1st and 2nd top end surfaces which provide a predetermined gap between the nozzle and the treatment surface wherein at least the 2nd top end surface comprises an "inclined surface".

Mitsumori teaches several embodiments of “fluid saving type fluid feed nozzles” including a particular embodiment (see fig 1 excerpt above) which comprises an introducing path (10) and discharge path (12).

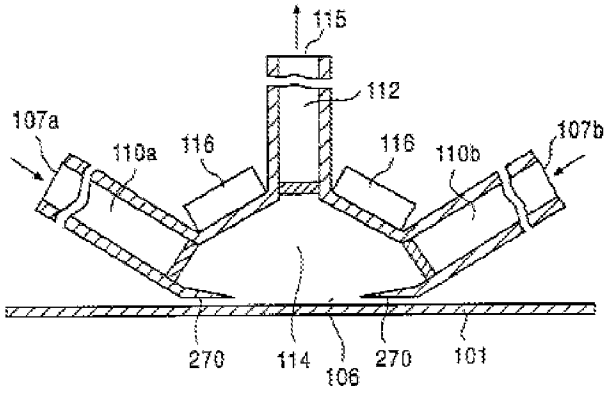
With respect to the claimed relative geometry between the inlet nozzle and the recovery path, the reference indicates that the angle of incidence between the

introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90^o (Column 14, lines 3-8). Where the discharge path or "recovery path" presents a $\theta_2 = 90^o$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1).

Regarding the claimed 1st and 2nd top end surface structures and with particular reference to the nozzle structure set forth in the figure 31A excerpt below , Mitsumori teaches the following;

> "an inner extension 270 provided on the peripheral edge of the opening section 106, from the peripheral edge toward inside, of which the outer surface is in parallel with the treated surface of the object to be wet-treated 101…When such an inner extension 270 is provided, it is possible to prevent air from the open air side from being entangled into the wet treatment liquid, since the wet treatment liquid in contact with the object to be wet-treated 101 communicates with the open air only through a very small gap between the object to be wet-treated 101 and the inner extension. It is also possible to prevent leakage of the wet treatment liquid to the open air side.:" (¶211-212)

FIG. 31A



It follows that Applicants claimed nozzle structure represents a straight forward combination of known features, namely a recovery path perpendicular to substrate surface and inner extensions (270) or 1st and 2nd top end surfaces, to yield a predictable outcome. Although the Mitsumori reference does not expressly provide for the claimed nozzle structure with first and second top end surfaces, it would have been obvious for one of ordinary skill in the art to incorporate the inner extensions (270) onto the disclosed nozzle having a recovery path perpendicular to the treatment surface. Such a modification would have been obvious for one of ordinary skill in the art seeking to "prevent air from the open air side from being entangled into the wet treatment liquid" as set forth by Mitsumori above. Any other minor structural distinctions between the claimed nozzle and that provided for in the prior art, should Applicant argue their existence, are understood to represent engineering design choices that would have been obvious to one of ordinary skill in the art at the time of the invention. As such, said differences are insufficient to patentably distinguish the claimed nozzle from that of the prior art absent any evidence to the contrary.

Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a constant separation distance (H1) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller(13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

Provision of an "annealing treatment unit" is obvious in view of Hashimoto (US 6,261,378) and the ordinary level of skill in the art

As noted above, Mitsumori teaches that the continuous treatment apparatus is applicable to the treatment of "large-sized substrates such as … a substrate for liquid crystal" (Column 1, lines 14-17). Mitsumori continues by stating that "the scope of this treatment covers washing with a liquid, etching, polishing, electroless plating, coating development and stripping of resist of an object to be treated, patterning of a thin film, and analysis of a surface deposit. In other words, the fluid treatment apparatus of the invention is applicable for a washing apparatus, an etching apparatus, … (and) an apparatus for coating, developing, and stripping of a resist" (Col. 7, lines 37-61).

In short, one of ordinary skill in the art of processing large-sized substrates for liquid crystal displays would reasonably interpret the Mitsumori disclosure as applicable to various steps in LCD manufacture including, *inter alia*, pre-treatment/washing of the substrate, application and subsequent development of a photo resist, patterned etching of the substrate, and stripping of the resist. Mitsumori is silent regarding Applicants newly presented limitation requiring " an annealing treatment unit" disposed downstream from the plural types of treatment units in the carrying direction for subjecting "an entire portion of the surface of the substrate", at the same time, to an annealing treatment.

The reference to Hashimoto et al. (US 6,261,378) teaches a cleaning unit for cleaning a substrate during fabrication of a liquid crystal display (LCD glass substrate (Col. 1, lines 6-9) which one of ordinary skill would appreciate as closely related to the Mitsumori apparatus. Hashimoto states that;

> "when a liquid crystal display is fabricated a sequence of processes using photolithography technology is used for forming an ITO (Indium Tin Oxide) thin film and an electrode pattern on a LCD substrate (glass substrate) in the same manner as the fabrication of semiconductor devices. In the photolithography process, a circuit pattern is reduced. The reduced circuit pattern is transferred to photoresist. The resultant photoresist is developed." (Col. 1, lines 19-37).

Pointing to the instant reference figure 2, Hashimoto teaches a conventional protocol in the production of an LCD panel (see particularly col. 3, lines 19-53). The general process comprises 1) a step of performing a nozzle cleaning operation for the substrate, 2) performing a hydrophobic process in an “adhesion unit”, 3) applying a photoresist film in a coating unit, 4) performing a pre-baking operation in a baking or “annealing treatment unit" in order to heat the photoresist film on the substrate, 5) imparting a pattern to the resist in an exposure unit, 6) developing the patterned resist in a developing unit.

Of particular relevance to the issue at hand, Hashimoto teaches a baking unit or an “annealing treatment unit” for pre-baking a photoresist during fabrication of a substrate for a liquid crystal display. Said annealing treatment unit is located downstream from plural types of treatment units in the carrying direction (e.g. cleaning, “lyophilic” or hydrophobic treatment, and photoresist application). In view of the foregoing, it would have been obvious for one of ordinary skill in the art to provide a similar annealing treatment unit downstream of the cleaning, “lyophilic” or hydrophobic treatment, and photoresist application steps Mitsumori apparatus when fabricating a “large-sized substrates such as … a substrate for liquid crystal”.

Additionally, Applicant is advised that provision of a soft baking or a "pre-baking" step for a photoresist prior to patterning exposure would be viewed as a fully conventional step to one of ordinary skill in the art familiar with lithographic processing. Although not particularly relied upon for the basis of the instant rejection, the general reference on Photoresist Processing (see for example

http://www.siliconfareast.com/resist-processing.htm and WO/1990/003597) provides insight into processing steps deemed conventional to the art of lithographic processing at the time of the invention. Specifically, one of ordinary skill would appreciate that the soft baking step conventionally serves to drive off residual solvent from the resist, improve the adhesion of the resist to the underlying substrate, and to anneal stresses imparted to the film during deposition. One of ordinary skill would incorporate such an annealing treatment step as a routine step for enhancing lithographic patterning fidelity as well as to increase device yield during the subsequent pattern etching step.

In short, the provision of an annealing treatment unit disposed outside and downstream of the plural types of treatment units in the carrying direction of the substrate would have represented an obvious modification to the Mitsumori apparatus for one of ordinary skill in the art. Such a modification constitutes no more than application of a known technique, namely soft baking, to a known device ready for improvement, namely a photoresist film on an LCD substrate, to yield predictable results.

It is further the Examiners assessment that one of ordinary skill in the art would be fully capable of determining a requisite scale or size of such an annealing treatment unit pursuant to a specific end application. That is, an annealing treatment unit "larger than each of the plural types of treatment units" and scaled to treat "an entire portion of the surface of the substrate at the same time" would have represented a merely trivial extension over the Mitsumori and Hashimoto teachings for one of ordinary skill in the art at the time of the invention.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsumori (US 6,230,722 B1) and Hashimoto et al. (US 6,261,378) as applied to claim 1 and further in view of Goodwin (US 5,324,155).

Mitsumori is silent regarding the structural details of the transport device and therefore fails to teach that the transport device described for transferring the substrate between treatment chambers should provide a suction portion to suction and hold the surface targeted for holding, which is opposite the surface targeted for treatment. Mitsumori further fails to explicitly indicate that transport device (855) comprises a guide component for guiding the holding portion in the carrying direction and a driving portion for transferring the holding portion along the guide component. Goodwin teaches a wafer handling system including a pair of robot arms and a drive portion with a plurality of ports providing a lifting action for a substrate by utilizing the Bernoulli principle. The device provides “low pressure” or a suction between the device and the surface of the substrate without contacting the substrate.

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a handling system in accord with the Goodwin apparatus as the transport device in the Mitsumori process. This would have been an obvious substitution to anyone seeking to minimize the possibility of damaging a fragile substrate by direct contact with the handling system or transport device.

Claims 1, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (US 6,921,148) in view of Mitsumori (US 6,230,722 B1).

With particular respect to Claims 1 and 6, Nakamura teaches a method of manufacturing the substrate of a display device wherein the substrate is selectively held by a carrier and carried along the carry direction (column 76, Lines 37-41) and through various process chambers wherein the object is subjected to sequential different treatments. As with any apparatus, the individual chambers may be disassembled and replaced at will.

With respect to Claims 4 and 8, Nakamura teaches a plasma processing protocol (Column 76, Lines 7 to Column 80, Line13) which reads on the claimed cleaning treatment unit and surface modification treatment unit. The disclosed liquid drop discharge process (column 86line65 – Column 87, line12), the drying process (Column 87, line 42-43), and the heat processing step (Column 88, lines35-40) are understood to read upon the liquid agent application treatment unit, drying treatment unit, and annealing treatment unit, respectively.

Specifically regarding the annealing treatment unit, Nakamura teaches that at a position after or "downstream" from the plural treatment units (e.g. discharge process), the substrate is placed into a vacuum oven and annealed for a predetermined duration. Although the size of such a system is not explicitly disclosed, it is the Examiners position that one of ordinary skill in the art would have been able to appropriately size the vacuum annealing apparatus. It follows that an annealing treatment unit "larger than

each of the plural types of treatment units" and scaled to treat "an entire portion of the surface of the substrate at the same time" would have represented a merely trivial extension over the Nakamura teachings for one of ordinary skill in the art at the time of the invention.

While Nakamura sets forth the fundamental process steps in accord with the claimed invention and an apparatus for the performance of these steps, the reference fails to explicitly indicate that the treatment surface faces downward and that the treatment units are operated upward. Nakamura is further silent regarding the particular details of the cleaning treatment unit as presently claimed.

Mitsumori teaches a wet treatment method and apparatus for treatment of “large-sized substrates such as … a substrate for liquid crystal” (Column 1, lines 14-17) which one of ordinary skill would recognize as directly relevant to the Nakamura teachings. Mitsumori teaches a variety of “fluid saving type fluid feed nozzles” including a particular embodiment (see fig 1 excerpt below) which comprises an introducing path (10) and discharge path (12). The reference indicates that the angle of incidence between the introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90^o (Column 14, lines 3-8). Where the discharge path or “recovery path” presents a $\theta_2 = 90^o$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1). Mitsumori further teaches the inclusion of inner extensions (270) or first and second top end surfaces. Combination of

these features, namely a recovery path perpendicular to the substrate surface and the inner extensions (270) has been set forth explicitly above.

FIG. 1

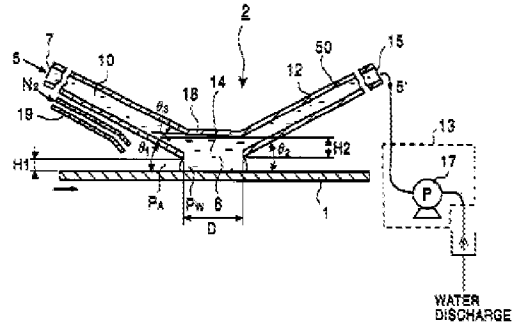
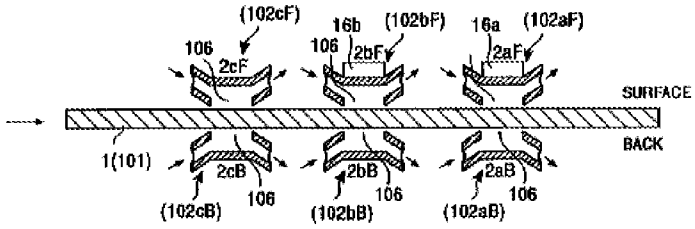


FIG. 11A



Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a constant separation distance (H1) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller(13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

As depicted in the instant reference Figure 11A, Mitsumori disclosed particular embodiments wherein the surface targeted for treatment faces downward and wherein the nozzle is operated to apply treatment in an upward facing direction. Further Mitsumori teaches that the disclosed nozzle provides substrate treatment with "under a

tenth the conventional consumption, and allow to obtain a higher cleanliness than conventional one".

In accordance with the Mitsumori disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the Mitsumori nozzle structure for that presented in the Nakamura reference. This modification would have been obvious to one of ordinary skill in the art seeking to reduce reagent consumption and reduced substrate contamination.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (US 6,921,148) and Mitsumori (US 6,230,722 B1) as applied to claim 1 above, and further in view of Goodwin (US 5,324,155).

Nakamura is silent regarding the structural details of the transport device and therefore fails to teach that the transport device described for transferring the substrate between treatment chambers should provide a suction portion to suction and hold the surface targeted for holding, which is opposite the surface targeted for treatment. Nakamura further fails to explicitly indicate that transport device (855) comprises a guide component for guiding the holding portion in the carrying direction and a driving portion for transferring the holding portion along the guide component. Goodwin teaches a wafer handling system including a pair of robot arms and a drive portion with a plurality of ports providing a lifting action for a substrate by utilizing the Bernoulli principle. The device provides a "low pressure" or a suction between the device and the

surface of the substrate without contacting the substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a handling system in accord with the Goodwin apparatus as the transport device in the Nakamura process. This would have been an obvious substitution to anyone seeking to minimize the possibility of damaging a fragile substrate by direct contact with the handling system or transport device.

Claims 1, 2, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cady (US 4,544,446) in view of Mitsumori (US 6,230,722 B1).

With particular reference to the instant reference figure 2 (see below), Cady teaches a treatment device for subjecting a surface of a substrate targeted for treatments to continuous plural types of treatments. Specifically, the reference teaches a substrate carrier (16) with treatment units (46).

As clearly depicted in the figure, the substrate surface targeted for treatment faces downward and the plural treatment units are operated upward to treat said targeted surface. A suction portion (16) or "vacuum chuck" holds a "surface targeted for holding" opposite the surface targeted for treatment and said suction portion is further interconnected with "a guide component" (18) and "a driving portion" (20) [**Claim 2**]. It is further evident that the fluid having been applied to the surface falls away (40) after having been applied to the surface.

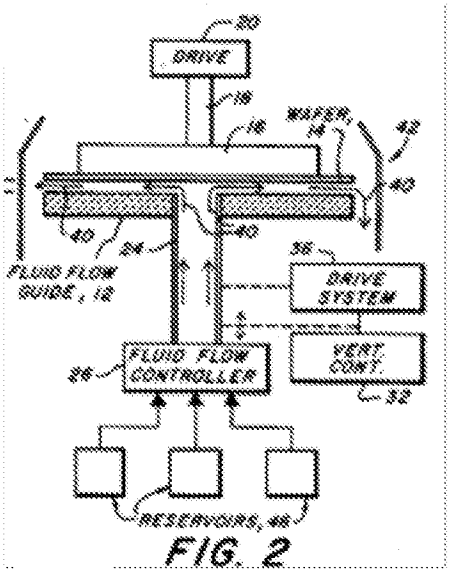


FIG. 2

With reference to the above figure, Cady sets forth that "it will be appreciated that the entire apparatus may be inverted such that the wafer is suspended from the top via vacuum chuck 16. The inverted system has the advantages of protecting the surface of the substrate from being contaminated by any particulates in the air falling from above, particularly during the loading and unloading steps. In addition, this configuration keeps all chemicals, and liquids and components in one location at the bottom of the reactor. Thus, during removal of the substrate, there is no accidental dripping of liquid on the newly cleansed or processed substrate. It will, of course, be appreciated that the chemicals must be placed under pressure in order to provide for the flow indicated by arrows 40." (Column 8, Lines 26-40)

The reference continues by teaching several processing steps widely recognized as conventional operations within the field of semiconductor processing. Specifically, Example 1 teaches wafer cleaning, Example 2 teaches a photoresist development step, Example 3 teaches a silica etching step, and Example 4 teaches a resist stripping step

(Column 12, line 25 to Column 13, line 67). Although the reference indicates that “many of the above operations (e.g. Example 1 through 4) can be done sequentially without removal of the wafer (from the fluid flow guides)” it does not explicitly require separate treatment units arranged side by side “along a carrying direction of the substrate” as claimed.

To this end, it is the Examiners position that providing a separate treatment unit (e.g. fig 2) for each of the disclosed conventional processing operations (examples 1 to 4) would be a merely obvious extension over the Cady teachings for one having an ordinary level of skill in the art of automated semiconductor processing (e.g. cassette-to-cassette process equipment). Specifically, this modification would be an obvious choice for anyone seeking to prevent cross contamination of sequential treatment fluids that may occur during sequential treatments in a single treatment unit. It would further be obvious, absent any compelling and unexpected results to the contrary, for one of ordinary skill to arrange these separate treatment units in any manner deemed most to the end user including “along a carrying direction of the substrate”.

Regarding the newly claimed “annealing treatment unit”, Cady explicitly teaches (Column 13, lines 3-32) a step of applying a photo resist to a cleaned wafer , removing the wafer from the coating apparatus, and baking the wafer in a convection oven or "annealing treatment unit" disposed outside of and downstream from the plural types of treatment units. It is the Examiners position that since the coated wafers are baked or annealed “in" the oven or annealing treatment unit, that said unit is capable of

subjecting an entire portion of the surface of the substrate at the same time to an annealing treatment. Again, one of ordinary skill would have been fully capable sizing the noted annealing treatment unit.

While Cady sets forth the fundamental process steps in accord with the claimed invention and an apparatus for the performance of these steps, the reference fails to explicitly teach the particular details of the cleaning treatment unit as presently claimed.

Mitsumori teaches a wet treatment method and apparatus for treatment of "large-sized substrates such as … a substrate for liquid crystal" (Column 1, lines 14-17) which one of ordinary skill would recognize as directly relevant to the Cady teachings. Mitsumori teaches a variety of "fluid saving type fluid feed nozzles" including a particular embodiment (see fig 1 excerpt below) which comprises an introducing path (10) and discharge path (12). The reference indicates that the angle of incidence between the introducing or discharge path and the substrate (1), θ_1 and θ_2 respectively, can each be varied between 0 and 90^o (Column 14, lines 3-8). Where the discharge path or "recovery path" presents a $\theta_2 = 90^o$, the nozzle is understood to present a recovery path formed by an inclined end surface of the nozzle (18) and an opposite surface (e.g. discharge path (12) wall which is distal from introducing path (10)) which is perpendicular to the surface targeted for treatment (1). Mitsumori further teaches the inclusion of inner extensions (270) or first and second top end surfaces. Combination of

these features, namely a recovery path perpendicular to the substrate surface and the inner extensions (270) has been set forth explicitly above.

FIG. 1

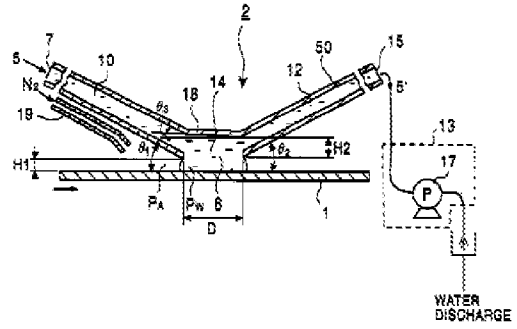
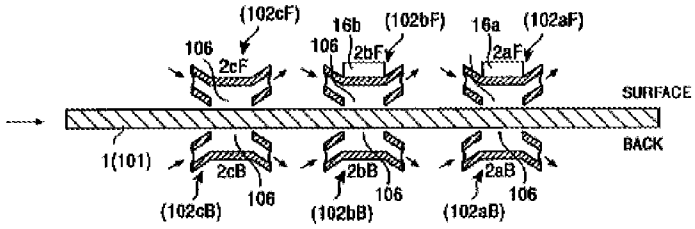


FIG. 11A



Mitsumori teaches that a sensor measures the distance between the nozzle and the substrate and provides feedback measurements to an actuator which provides for a constant separation distance (H1) (Column 14, lines 35-51). From the foregoing, it is understood that the "top end surfaces" of the nozzle are "disposed with a predetermined gap from the surface targeted for treatment". Finally, the reference teaches that the nozzle includes a pressure controller (13) which "comprises a reduced pressure pump provided on the discharging port side (15) (Column 13, lines 16-17). The provision of a reduced pressure pump is understood to encompass Applicants embodiment wherein "the recovery path is evacuated to a pressure that is less than atmospheric pressure"

As depicted in the instant reference Figure 11A, Mitsumori disclosed particular embodiments wherein the surface targeted for treatment faces downward and wherein the nozzle is operated to apply treatment in an upward facing direction. Further Mitsumori teaches that the disclosed nozzle provides substrate treatment with "under a tenth the conventional consumption, and allow to obtain a higher cleanliness than

conventional one". In accordance with the Mitsumori disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the disclosed fluid flow guide (12) in Cady with the "fluid saving feed nozzle" disclosed by Mitsumori. This modification would have been obvious to one of ordinary skill in the art seeking to reduce reagent consumption and to reduce substrate contamination.

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 4, 6, and 8 have been considered but are moot in view of the new ground(s) of rejection.

Specifically Applicant argues that each of the references to Mitsumori (US 6,230,722) [see page 8/12], Nakamura (US 6,921,148) [see page 9/12], and Cady (US 4,544,446) [see page 10/12] are silent regarding;

1) plural types of treatment units arranged side by side along the carrying direction of the substrate, and to

2) an annealing treatment unit disposed outside the plural types of treatment units and downstream from the plural types of treatment units in the carrying direction.

Mitsumori

With respect to these allegations, Applicant was previously advised that Mitsumori teaches that substrate (1) is subjected continuous plural types of treatments wherein the substrate is selectively held above treatment units (2cB, 2bB, 2AB) arranged along the carrying direction of the substrate. Applicants has failed to provide

any persuasive arguments to rebut this position beyond the general allegation and it follows that said allegation is held to be unpersuasive. Applicants' arguments alleging that Mitsumori fails to teach the claimed annealing treatment unit are moot in view of the new grounds of rejection.

Nakamura

With respect to the plural treatment unit arrangement, Applicant was previously advised that Nakamura teaches a method of manufacturing the substrate of a display device wherein the substrate is selectively held by a carrier and carried along the carry direction (column 76, Lines 37-41) and through various process chambers wherein the object is subjected to sequential different treatments. Applicants' general argument purporting otherwise are unpersuasive.

Regarding the annealing treatment unit, Applicant was prior advised that Nakamura teaches a heat processing step (Column 88, lines35-40) which is understood to read upon the annealing treatment unit. Applicants' arguments alleging otherwise are unpersuasive.

Cady

Applicant was previously advised that it would have been obvious to provide a separate apparatus for each of the Cady disclosed processing steps in order to avoid cross contamination of reagents during each step. Applicant was further advised that it would be obvious, absent any compelling and unexpected results to the contrary, for

one of ordinary skill to arrange these separate treatment units in any manner deemed most appropriate to the end user including “along a carrying direction of the substrate”. Applicant has failed to provide a cogent rebuttal to the Examiners’ stated position and arguments are held to be a mere allegation of patentability without a clear delineation of how the claim language defines over the prior art.

Regarding the newly claimed “annealing treatment unit”, Cady explicitly teaches (Column 13, lines 3-32) a step of applying a photo resist to a cleaned wafer , removing the wafer from the coating apparatus, and baking the wafer in a convection oven or "annealing treatment unit" disposed outside of and downstream from the plural types of treatment units.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason L Lazorcik/
Examiner, Art Unit 1791